

CLAIMS

That which is claimed:

1. A method of selecting delays for a RAKE receiver, comprising:
searching a plurality of multi-paths to select a set of multi-path delays
associated with the highest signal to interference ratios (SIRs) and/or power values;
averaging the respective SIR values and/or power values for the multi-path
5 delays over a time interval;
selecting those multi-path delays from the set of multi-path delays and a
previous set of multi-path delays that have SIR values and/or power values greater
than a threshold value to generate a monitored set of multi-path delays;
filtering the SIR values and/or power values associated with the monitored set
10 of multi-path delays;
eliminating at least one multi-path delay from the monitored set of multi-path
delays as being correlated with another multi-path delay of the monitored set of multi-
path delays to generate an output set of multi-path delays; and
providing the output set of multi-path delays to a RAKE receiver.
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2. The method of Claim 1, wherein the searching, averaging, and
multiplying are performed for a plurality of different cells.
3. The method of Claim 1, wherein selecting those multi-path delays from
20 the set of multi-path delays and the previous set of multi-path delays that have SIR
values and/or power values greater than the threshold value comprises:
selecting those multi-path delays from the set of multi-path delays and the
previous set of multi-path delays that have SIR values and/or power values greater
than the threshold value such that the selected multi-path delays are associated with a
25 plurality of cells.
4. The method of Claim 1, wherein the threshold value is a first threshold
value, and wherein selecting those multi-path delays from the set of multi-path delays
and the previous set of multi-path delays that have SIR values and/or power values

greater than the first threshold value such that the selected multi-path delays are associated with the plurality of cells comprises:

replacing a multi-path delay associated with a first cell that has a smallest SIR value and/or power value associated therewith with a multi-path delay associated with
5 a second cell that has an SIR value and/or power value greater than a second threshold value.

5. The method of Claim 1, further comprising:
expanding the monitored set of multi-path delays by adding multi-path delays
10 to the monitored set of multi-path delays that are within a half chip of existing ones of the monitored set of multi-path delays.

6. The method of Claim 5, further comprising:
initializing the SIR values and/or power values for those multi-path delays
15 added to the monitored set of multi-path delays while expanding based on SIR values and/or power values associated with the previous set of multi-path delays.

7. The method of Claim 5, further comprising:
initializing the SIR values and/or power values for those multi-path delays
20 added to the monitored set of multi-path delays while expanding by using a first scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and by using a second scaling factor for respective ones of those added multi-path delays that have only a left or right neighbor multi-path delay.

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8. The method of Claim 5, further comprising:
initializing the SIR values and/or power values for those multi-path delays added to the monitored set of multi-path delays while expanding by using a first scaling factor for respective ones of those added multi-path delays that have both left
30 and right neighbor multi-path delays and are within a quarter chip of an existing one of the multi-path delays, using a second scaling factor for respective ones of those added multi-path delays that have only a left or right neighbor multi-path delay and are within a quarter chip of an existing one of the multi-path delays, using a third

scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and are between a quarter chip and a half chip away from an existing one of the multi-path delays, and using a fourth scaling factor for respective ones of those added multi-path delays that have only a left or right
5 neighbor multi-path delay and are between a quarter chip and a half chip away from an existing one of the multi-path delays.

9. The method of Claim 1, wherein eliminating the at least one multi-path delay from the monitored set of multi-path delays comprises:
10 reducing SIR values and/or power values associated with selected ones of the monitored set of multi-path delays based on their correlation with other ones of the monitored set of multi-path delays; and
eliminating those multi-path delays from the monitored set of multi-path delays that have SIR values and/or power values less than the threshold value.

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10. The method of Claim 1, wherein the monitored set of multi-path delays is a first monitored set of multi-path delays, the threshold value is a first threshold value, the output set of multi-path delays is a first output set of multi-path delays, and wherein the method further comprises:

20 selecting those multi-path delays from the output set of multi-path delays that have SIR values and/or power values greater than the first threshold value to generate a second monitored set of multi-path delays;

expanding the second monitored set of multi-path delays by adding multi-path delays to the second monitored set of multi-path delays that are within a half chip of
25 existing ones of the second monitored set of multi-path delays;

filtering the SIR values and/or power values associated with the second monitored set of multi-path delays;

30 selecting those multi-path delays from the second monitored set of multi-path delays that have SIR values and/or power values greater than a second threshold value to generate a third monitored set of multi-path delays;

eliminating at least one multi-path delay from the third monitored set of multi-path delays as being correlated with another multi-path delay of the third monitored set of multi-path delays to generate a fourth monitored set of multi-path delays;

selecting those multi-path delays from the fourth monitored set of multi-path delays that have SIR values greater than the second threshold value to generate an output set of multi-path delays; and

providing the second output set of multi-path delays to a RAKE receiver.

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11. The method of Claim 1, further comprising:

multiplying the averaged SIR values and/or power values by a scaling factor so as to reduce the averaged SIR values and/or power values before selecting those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value to generate the monitored set of multi-path delays.

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12. The method of Claim 1, wherein selecting those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value to generate the monitored set of multi-path delays comprises:

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determining if the set of multi-path delays and the previous set of multi-path delays includes any common multi-path delays; and

associating with respective ones of the common multi-path delays a maximum SIR value and/or power value of the SIR value and/or power value associated with respective ones of the common multi-path delays in the set of multi-path delays and the SIR value and/or power value associated with respective ones of the common multi-path delays in the previous set of multi-path delays.

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13. A system for selecting delays for a RAKE receiver, comprising:

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means for searching a plurality of multi-paths to select a set of multi-path delays associated with the highest signal to interference ratios (SIRs) and/or power values;

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means for averaging the respective SIR values and/or power values for the multi-path delays over a time interval;

means for selecting those multi-path delays from the set of multi-path delays and a previous set of multi-path delays that have SIR values and/or power values greater than a threshold value to generate a monitored set of multi-path delays;

means for filtering the SIR values and/or power values associated with the monitored set of multi-path delays;

means for eliminating at least one multi-path delay from the monitored set of multi-path delays as being correlated with another multi-path delay of the monitored set of multi-path delays to generate an output set of multi-path delays; and

means for providing the output set of multi-path delays to a RAKE receiver.

14. The system of Claim 13, wherein the means for selecting those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value comprises:

means for selecting those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value such that the selected multi-path delays are associated with a plurality of cells.

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15. The system of Claim 13, wherein the threshold value is a first threshold value, and wherein the means for selecting those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the first threshold value such that the selected multi-path delays are associated with the plurality of cells comprises:

means for replacing a multi-path delay associated with a first cell that has a smallest SIR value and/or power value associated therewith with a multi-path delay associated with a second cell that has an SIR value and/or power value greater than a second threshold value.

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16. The system of Claim 13, further comprising:

means for expanding the monitored set of multi-path delays by adding multi-path delays to the monitored set of multi-path delays that are within a half chip of existing ones of the monitored set of multi-path delays.

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17. The system of Claim 16, further comprising:

means for initializing the SIR values and/or power values for those multi-path delays added to the monitored set of multi-path delays while expanding based on SIR values and/or power values associated with the previous set of multi-path delays.

5 18. The system of Claim 16, further comprising:

 means for initializing the SIR values and/or power values for those multi-path delays added to the monitored set of multi-path delays while expanding by using a first scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and by using a second scaling factor for
10 respective ones of those added multi-path delays that have only a left or right neighbor multi-path delay.

 19. The system of Claim 16, further comprising:

 means for initializing the SIR values and/or power values for those multi-path
15 delays added to the monitored set of multi-path delays while expanding by using a first scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and are within a quarter chip of an existing one of the multi-path delays, using a second scaling factor for respective ones of those added multi-path delays that have only a left or right neighbor multi-path delay and
20 are within a quarter chip of an existing one of the multi-path delays, using a third scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and are between a quarter chip and a half chip away from an existing one of the multi-path delays, and using a fourth scaling factor for respective ones of those added multi-path delays that have only a left or right
25 neighbor multi-path delay and are between a quarter chip and a half chip away from an existing one of the multi-path delays.

 20. The system of Claim 13, wherein the means for eliminating the at least one multi-path delay from the monitored set of multi-path delays comprises:

30 means for reducing SIR values and/or power values associated with selected ones of the monitored set of multi-path delays based on their correlation with other ones of the monitored set of multi-path delays; and

means for eliminating those multi-path delays from the monitored set of multi-path delays that have SIR values and/or power values less than the threshold value.

21. The system of Claim 13, wherein the monitored set of multi-path
5 delays is a first monitored set of multi-path delays, the threshold value is a first threshold value, the output set of multi-path delays is a first output set of multi-path delays, and wherein the system further comprises:

means for selecting those multi-path delays from the output set of multi-path
delays that have SIR values and/or power values greater than the first threshold value
10 to generate a second monitored set of multi-path delays;

means for expanding the second monitored set of multi-path delays by adding
multi-path delays to the second monitored set of multi-path delays that are within a
half chip of existing ones of the second monitored set of multi-path delays;

means for filtering the SIR values and/or power values associated with the
15 second monitored set of multi-path delays;

means for selecting those multi-path delays from the second monitored set of
multi-path delays that have SIR values and/or power values greater than a second
threshold value to generate a third monitored set of multi-path delays;

means for eliminating at least one multi-path delay from the third monitored
20 set of multi-path delays as being correlated with another multi-path delay of the third monitored set of multi-path delays to generate a fourth monitored set of multi-path delays;

means for selecting those multi-path delays from the fourth monitored set of
multi-path delays that have SIR values and/or power values greater than the second
25 threshold value to generate an output set of multi-path delays; and

means for providing the second output set of multi-path delays to a RAKE
receiver.

22. The system of Claim 13, further comprising:

30 means for multiplying the averaged SIR values and/or power values by a scaling factor so as to reduce the averaged SIR values and/or power values before selecting those multi-path delays from the set of multi-path delays and the previous set

of multi-path delays that have SIR values and/or power values greater than the threshold value to generate the monitored set of multi-path delays.

23. The system of Claim 13, wherein the means for selecting those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value to generate the monitored set of multi-path delays comprises:

means for determining if the set of multi-path delays and the previous set of multi-path delays includes any common multi-path delays; and

10 means for associating with respective ones of the common multi-path delays a maximum SIR value and/or power value of the SIR value and/or power value associated with respective ones of the common multi-path delays in the set of multi-path delays and the SIR value and/or power value associated with respective ones of the common multi-path delays in the previous set of multi-path delays.

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24. A computer program product for selecting delays for a RAKE receiver, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

20 computer readable program code configured to search a plurality of multi-paths to select a set of multi-path delays associated with the highest signal to interference ratios (SIRs) and/or power values;

computer readable program code configured to average the respective SIR values and/or power values for the multi-path delays over a time interval;

25 computer readable program code configured to select those multi-path delays from the set of multi-path delays and a previous set of multi-path delays that have SIR values and/or power values greater than a threshold value to generate a monitored set of multi-path delays;

30 computer readable program code configured to filter the SIR values and/or power values associated with the monitored set of multi-path delays;

computer readable program code configured to eliminate at least one multi-path delay from the monitored set of multi-path delays as being correlated with

another multi-path delay of the monitored set of multi-path delays to generate an output set of multi-path delays; and

computer readable program code configured to provide the output set of multi-path delays to a RAKE receiver.

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25. The computer program product of Claim 24, wherein the computer readable program code configured to select those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value comprises:

10 computer readable program code configured to select those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value such that the selected multi-path delays are associated with a plurality of cells.

15 26. The computer program product of Claim 24, wherein the threshold value is a first threshold value, and wherein the computer readable program code configured to select those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the first threshold value such that the selected multi-path delays are associated
20 with the plurality of cells comprises:

computer readable program code configured to replace a multi-path delay associated with a first cell that has a smallest SIR value and/or power value associated therewith with a multi-path delay associated with a second cell that has an SIR value and/or power value greater than a second threshold value.

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27. The computer program product of Claim 24, further comprising:

computer readable program code configured to expand the monitored set of multi-path delays by adding multi-path delays to the monitored set of multi-path delays that are within a half chip of existing ones of the monitored set of multi-path
30 delays.

28. The computer program product of Claim 27, further comprising:

computer readable program code configured to initialize the SIR values and/or power values for those multi-path delays added to the monitored set of multi-path delays while expanding based on SIR values and/or power values associated with the previous set of multi-path delays.

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29. The computer program product of Claim 27, further comprising:

computer readable program code configured to initialize the SIR values and/or power values for those multi-path delays added to the monitored set of multi-path delays while expanding by using a first scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and by using a second scaling factor for respective ones of those added multi-path delays that have only a left or right neighbor multi-path delay.

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30. The computer program product of Claim 27, further comprising:

computer readable program code configured to initialize the SIR values and/or power values for those multi-path delays added to the monitored set of multi-path delays while expanding by using a first scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and are within a quarter chip of an existing one of the multi-path delays, using a second scaling factor for respective ones of those added multi-path delays that have only a left or right neighbor multi-path delay and are within a quarter chip of an existing one of the multi-path delays, using a third scaling factor for respective ones of those added multi-path delays that have both left and right neighbor multi-path delays and are between a quarter chip and a half chip away from an existing one of the multi-path delays, and using a fourth scaling factor for respective ones of those added multi-path delays that have only a left or right neighbor multi-path delay and are between a quarter chip and a half chip away from an existing one of the multi-path delays.

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31. The computer program product of Claim 24, wherein the computer

readable program code configured to eliminate the at least one multi-path delay from the monitored set of multi-path delays comprises:

computer readable program code configured to reduce SIR values and/or power values associated with selected ones of the monitored set of multi-path delays

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based on their correlation with other ones of the monitored set of multi-path delays;
and

computer readable program code configured to eliminate those multi-path
delays from the monitored set of multi-path delays that have SIR values and/or power
5 values less than the threshold value.

32. The computer program product of Claim 24, wherein the monitored set
of multi-path delays is a first monitored set of multi-path delays, the threshold value is
a first threshold value, the output set of multi-path delays is a first output set of multi-
10 path delays, and wherein the system further comprises:

computer readable program code configured to select those multi-path delays
from the output set of multi-path delays that have SIR values and/or power values
greater than the first threshold value to generate a second monitored set of multi-path
delays;

15 computer readable program code configured to expand the second monitored
set of multi-path delays by adding multi-path delays to the second monitored set of
multi-path delays that are within a half chip of existing ones of the second monitored
set of multi-path delays;

computer readable program code configured to filter the SIR values and/or
20 power values associated with the second monitored set of multi-path delays;

computer readable program code configured to select those multi-path delays
from the second monitored set of multi-path delays that have SIR values and/or power
values greater than a second threshold value to generate a third monitored set of multi-
path delays;

25 computer readable program code configured to eliminate at least one multi-
path delay from the third monitored set of multi-path delays as being correlated with
another multi-path delay of the third monitored set of multi-path delays to generate a
fourth monitored set of multi-path delays;

computer readable program code configured to select those multi-path delays
30 from the fourth monitored set of multi-path delays that have SIR values and/or power
values greater than the second threshold value to generate an output set of multi-path
delays; and

computer readable program code configured to provide the second output set of multi-path delays to a RAKE receiver.

33. The computer program product of Claim 24, further comprising:
5 computer readable program code configured to multiply the averaged SIR values and/or power values by a scaling factor so as to reduce the averaged SIR values and/or power values before selecting those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values and/or power values greater than the threshold value to generate the monitored set of multi-
10 path delays.

34. The computer program product of Claim 24, wherein the computer readable program code configured to select those multi-path delays from the set of multi-path delays and the previous set of multi-path delays that have SIR values
15 and/or power values greater than the threshold value to generate the monitored set of multi-path delays comprises:

computer readable program code configured to determine if the set of multi-path delays and the previous set of multi-path delays includes any common multi-path delays; and
20 computer readable program code configured to associate with respective ones of the common multi-path delays a maximum SIR value and/or power value of the SIR value and/or power value associated with respective ones of the common multi-path delays in the set of multi-path delays and the SIR value and/or power value associated with respective ones of the common multi-path delays in the previous set of
25 multi-path delays.

35. An electronic device, comprising:
a path searcher module that is configured to search a plurality of multi-paths to select a set of multi-path delays associated with the highest signal to interference
30 ratios (SIRs) and/or power values;
a delay despreading and SIR calculation module that is configured to average the respective SIR values and/or power values for the multi-path delays over a time

interval and to multiply the averaged SIR values and/or power values by a scaling factor so as to reduce the averaged SIR values and/or power values;

- 5 a delay selection and monitoring module that is configured to select those multi-path delays from the set of multi-path delays and a previous set of multi-path delays that have SIR values and/or power values greater than a threshold value to generate a monitored set of multi-path delays, to filter the SIR values and/or power values associated with the monitored set of multi-path delays; to eliminate at least one multi-path delay from the monitored set of multi-path delays as being correlated with another multi-path delay of the monitored set of multi-path delays to generate an
- 10 output set of multi-path delays; and
 - a RAKE receiver having fingers tuned based on the output set of multi-path delays.